REMARKS

In accordance with the Final Office Action, claims 1-27 stand rejected and Claims 28-34 have been withdrawn from further consideration. More particularly, the Examiner has rejected independent Claims 1 and 15 under 35 U.S.C. § 103(a) contending that such claims are obvious based on U.S. Patent No. 5,143,770 to Gonczy et al. (Gonczy) in view of United States Patent No. 6,521,077 to McGivern et al. (McGivern) and JP 2003-260371 assigned to Sanyo (hereinafter Sanyo). Applicant submits that independent Claims 1 and 15 as presently presented are not obvious based on Gonczy in view of McGivern and Sanyo and respectfully requests reconsideration and allowance of independent Claims 1 and 15 and all claims depending therefrom.

Independent Claim 1 is directed to a multi-layer insulation blanket providing thermal protection to a spacecraft portion comprising a portion of the spacecraft on which thermal protection is desirable and a multi-layer insulation blanket attachable on the portion of the spacecraft to provide thermal protection to the portion of the spacecraft. The multi-layer insulation blanket includes an outer sheet of thermally insulative material having a reflective surface on a side of the outer sheet of thermally insulative plastic material facing space when the multi-layer insulation blanket is attached to the spacecraft, at least one inner sheet of thermally insulative plastic material between the outer sheet of thermally insulative plastic material and the spacecraft when the multi-layer insulation blanket is attached to the spacecraft, a coating of anti-contaminant material overlying the reflective surface of the outer sheet of thermally insulative plastic material, and an outermost electrically conductive layer overlying the coating of anti-contaminant material. The coating of anti-contaminant material is effective to induce the breakdown of organic residues on the outer surface of the outer sheet of thermally insulative plastic material in the presence of solar radiation, and the coating of anti-contaminant material has a thickness no greater than 200 nanometers.

Independent Claim 15 is directed to a multi-layer insulation blanket attachable on a structure intended for use in vacuum conditions. The multi-layer insulation blanket comprises an outer sheet of thermally insulative plastic material having a reflective surface on at least a first side thereof facing away from the structure when the multi-layer insulation blanket is attached to the structure, at

least one inner sheet of thermally insulative plastic material between the outer sheet and the structure when the multi-layer insulation blanket is attached to the structure, a high emittance layer overlying the reflective surface of the outer sheet of thermally insulative plastic material, a coating of photocatalytic material overlying the high emittance layer, and an outermost electrically conductive layer overlying the coating of photocatalytic material. The coating of photocatalytic material catalyzes the breakdown of organic residues on the outer surface of the outer sheet of thermally insulative plastic material when exposed to at least one of ultraviolet and near-ultraviolet radiation, and the coating of photocatalytic material has a thickness no greater than 200 nanometers.

Gonczy discloses a multilayer insulation blanket for insulating cryogenic structures operating at very low temperatures such as a cryosat of the Super-conducting Super Collider. (See Abstract and Col. 1, lines 14-16, FIG. 1, and Col. 5 line 28 through Col. 6, line 3). Gonczy further mentions that the multilayer insulation blanket may generally be useful in applications that require a supported structure to be insulated in a cryogenic environment subject to wide temperature fluctuations such as low temperature magnets for industrial and medical uses, dewars for storing liquified gases at low temperatures and vehicles for transporting low temperature materials. (See Col. 4, lines 54-63). Despite the various applications mentioned in Gonczy for the multilayer insulation blanket, Gonczy does not disclose use of the multilayer insulation blanket to provide thermal protection for a portion of a spacecraft.

Further, as noted by the Examiner, Gonczy does not disclose inclusion of an anti-contaminant material or a photocatalyst material on an outer layer of the multilayer insulation blanket. In fact, Gonczy provides no motivation or suggestion for including such a material because the multilayer insulation blankets 40, 41 and 42 in Gonczy are enclosed within vacuum vessel 39 of the cryosat 10 and thus would not be exposed to solar radiation/ultraviolet and near ultraviolet radiation.

McGivern discloses a packaged multilayer insulation blanket and method of insulating a member such as a cryogenic tank, pipe, or other cryogenic or extreme temperature element with multilayer insulation. (See e.g., Abstract of McGivern). In listing a number of number of items that the member to be insulated by the method may be, McGivern does mention briefly that the member can be "a heat shield for a spacecraft". (McGivern, Col. 3, line 44). However,

McGivern does not mention the need for any features that would make a multilayer insulation blanket particularly suited for spacecraft applications wherein the blanket is expected to be exposed to solar radiation/ultraviolet and near ultraviolet radiation. Thus, McGivern provides no motivation or suggestion for including an anti-contamination or photocatalytic coating on a multi-layer insulation blanket. Further, McGivern makes no mention of the possibility that an electrically conductive or dissipative outer surface may be required in some spacecraft applications. Thus, McGivern provides no motivation or suggestion for including an outermost electrically conductive layer on a multi-layer insulation blanket.

Sanyo discloses deposition of a multi-layer film having a photocatalytic function onto a substrate wherein the substrate is rotated through a plurality of deposition zones disposed on the side walls of a vacuum chamber. Sanyo discloses that the multi-layer structure is formed by plasma etching of the substrate in a first deposition zone, deposition of an adhesive layer such as TiO_2 or SiO_2 to 5-20 nm thickness on the substrate in a second deposition zone, deposition of a TiN, AIN, or ITO film to 10-60nm thickness in a third deposition zone to promote crystallization of a TiO_2 photocatalytic functional film, deposition of the crystallized TiO_2 film to 100-500nm thickness in a fourth deposition zone, and deposition of an ultrahydrophilic SiO_2 film to 5-20 nm thickness in a fifth deposition zone. Thus, in Sanyo the 10-60 nm thick TiN, AIN, or ITO film is the third of five layers (with the substrate being the first layer), and the TiN, AIN, or ITO film underlies two additional layers (the crystallized TiO_2 film and the ultrahydrophilic SiO_2 film) that together may be as thick as 520 nm.

In contrast with the third layer disclosed in Sanyo, in both Claims 1 and 15, the electrically conductive layer is the outermost layer. Having the electrically conductive layer be the outermost layer facilitates post-application electrical conductivity measurement. (See pg. 7, lines 20-21 of Application). Further, the purpose of the electrically conductive layer is to provide an electrically conductive or dissipative outer surface that may be required in spacecraft applications. (See pg. 7, lines 12-14 of Application). In Sanyo, the purpose of the third layer is to promote crystallization of the subsequently deposited fourth layer. Sanyo does not recognize a need for an electrically conductive or dissipative outer surface and makes no mention that the third layer provides such an electrically conductive outer surface.

Due to the noted deficiencies with the disclosures of Gonczy, McGivern and Sanyo, one skilled in the art could not combine the teachings of Gonczy, McGivern and Sanyo to achieve Applicant's invention claimed in independent Claims 1 and 15, nor would one skilled in the art be motivated to modify the teachings of Gonczy, McGivern and Sanyo to achieve Applicant's invention claimed in independent Claims 1 and 15. Since independent Claims 1 and 15 are allowable, there is no need to separately address the patentability of claims dependent thereon.

Conclusion:

In view of the foregoing, allowance of all examined claims is respectfully requested. In the event that a telephone conference would further prosecution, the Examiner is invited to contact the undersigned.

Respectfully submitted,
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